UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MAY 15 1998

Mr. Jack McElroy, President
Geosafe Corporation
2952 George Washington Way
Richland, Washington 99352

Dear Mr. McElroy:

Mr. Craig Timmerman, in a letter to Hiroshi Dodohara dated April 17, 1998, describes the Planar-ISV (In-Situ Vitrification) technology developed by Geosafe. Geosafe intends to use this technology on a site which contains underground storage tanks containing liquids and PCBs in the sludge. EPA believes the scope of the proposed method is beyond that specified in the current PCB disposal approval issued under the Toxic Substance Control Act because the configuration of the ISV equipment is altered. Therefore, Geosafe must demonstrate the effectiveness of the modified configuration. The current approval applies to horizontally oriented melts where the vitrification melts traverse downward. The Planar-ISV utilizes vertically-oriented melts which traverse horizontally. The horizontally oriented planar configuration allows safe venting of volatile components for treatment in the off-gas system, including a thermal oxidizer.

Geosafe has tested the Planar-ISV in conjunction with a DOE remediation project at its test facility, Idaho National Engineering and Environmental Laboratory (INEEL). No PCBs or other hazardous waste were involved. EPA will require Geosafe to conduct a TSCA demonstration to amend the current PCB Disposal Approval. In order to issue a demonstration approval, Geosafe must submit the Work Plan for the NEEL project for EPA approval. Sampling of flue gas must confirm 99.9999% destruction and removal efficiency, solid residue must contain less than 2 ppm PCBs, and aqueous waste must indicate levels less than 3 ppb. Residues containing greater levels of PCBs than specified must be disposed of as if they contained the original concentration of PCBs.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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2950 George Washington Way
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Thank you for your cooperation with EPA representatives. If you have any questions regarding this matter, please contact Hiroshi Dodohara at (202) 260-3959.

Sincerely,

CONCURRENCES

SYMBOL	7404	7404		John W.	Melone,	Director		

Thank you for your cooperation with EPA representatives. If you have any questions regarding this matter, please contact Hiroshi Dodohara at (202) 260-3959.

Sincerely,

John W. Melone, Director
National Program Chemicals Division

cc: Dan Duncan
USEPA, Region X

Richard Wilkening
USEPA, Region X

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April 17, 1998

SENT BY FAX AND FEDEX

Mr. Hiroshi Dodohara
U.S. Environmental Protection Agency
401 M. Street SW
Washington, DC 20460

PROPOSED PLANAR ISV TREATMENT OF UNDERGROUND TANKS CONTAINING PCBS

Dear Mr. Dodohara:

This letter requests your guidance and agreement regarding the proposed application of Geosafe's In Situ Vitrification (ISV) technology to treatment of underground storage tanks that contain mixed waste including small amounts of PCBs. The proposed application will employ an advanced melting approach termed "planar-ISV". Our potential client is the U.S. DOE through their contractor, Lockheed Martin Idaho Technologies Company (LMITCO). LMITCO operates the Idaho National Engineering and Environmental Laboratory (INEEL) for the DOE. Very successful treatability testing has been performed on this application, and the draft ROD for the site is due within about one month. Before specifying the ISV technology in the ROD, the client and associated regulators (EPA Region 10 and the State of Idaho) desire to know if Geosafe's PCB Disposal Approval is applicable to this project either directly, as it currently stands, or indirectly on a demonstration basis involving select data gathering as needed to amend and broaden the permit. This is an important regulatory and stakeholder matter; thus the client desires something in writing from EPA that indicates the ISV technology can be applied at the site, assuming that existing permit conditions and any new data acquisition requirements are or will be satisfied. Specifics of the remediation application are provided below.

As you know, conventional ISV involves formation of a melt at or near the ground surface that melts downward and outward through a target treatment zone. That approach to melting has been very successful; however, it has limitations relative to treatment of sealed containers containing water or other liquids. Such containers cannot be treated unless they are first preconditioned (damaged) in such a manner that vapors generated within them can escape to the dry zone soil without passing through the melt to the surface. Such preconditioning was successfully demonstrated in Spokane as part of our TSCA Demonstration project.

Over the past 18 months, Geosafe has developed an adaptation of the ISV process specifically directed to safe treatment of containerized and high-gas generation wastes. This planar melting adaptation is described in the enclosed newsletter and is illustrated in the attached visual

passing in a horizontal "X" pattern between two pair of opposing electrodes in a square formation, planar melting involves use of two pairs of electrodes to produce two vertically oriented melts that are initially spaced apart from each other. Such melts can be initiated below grade and in a vertically tall configuration (up to 5-ft tall demonstrated to date). After initiation, planar melts do incur some downward melt movement; but the primary direction of melt movement is horizontal. This feature enables several new applications, most importantly the treatment of underground tanks containing liquids, and other high gas generating buried waste.

For the buried tank application, two planar melts are initiated at the sides of the tank, followed by predominantly sidewards-in melting. Such treatment of larger, vented tanks containing water or other liquids results in the generation of vapors which move to the surface through riser vent pipes between the melts. The melts eventually grow together and form one large melt, but not before all liquids have been removed from the tank. In this way, safety is ensured against the risk of potential melt upset due to passage of large quantities of vapors through a melt.

This planar technology has been developed through large-scale. Many tests have been done on tanks including the following sizes: <1, 55, 110, 2,000 and 4,500-gal. This technology advancement is of much interest to DOE sites that have underground tanks containing radioactive contaminants that emit hard gamma radiation. In situ treatment is highly desired in such cases. One such case is the V-Tank site at the Test Area North of the INEEL. These tanks contain a sludge bearing various radionuclides, hazardous organics (e.g., TCE), and PCBs. DOE terms such contaminated media as "Tri-Waste". The attached tables indicate the contaminants involved and the quantities present. Note that the PCBs are in the sludge at the bottoms of the tanks and are at quite low levels (approximately 300 ppm). In addition, the tanks are about half full of supernate, which is primarily water.

The largest of the V-Tanks are 10-ft in diameter by 19-ft 4-in long. DOE has funded Geosafe to perform testing on a simulated V-Tank. In this testing, we demonstrated the ability to make planar melts up to 24-ft long (which is sufficient to treat the full-scale tanks), and to treat tanks up to 8-ft in diameter and 12-ft in length. This was a non-radioactive treatability test which was designed to confirm the selection of ISV in the Feasibility Study. Now DOE and LMITCO are anticipating the selection of ISV in the draft ROD for the site, given that ISV can be applied as appropriate under TSCA regulations.

The attached figures indicate how planar melting would be applied to remediation of the INEEL V-Tanks. The figures contain eight drawings which illustrate the current condition of the tanks and the progressive steps of the proposed treatment concept. There are three V-Tanks located parallel to each other with an approximate 3-ft separation between tanks. The tops of the tanks are located at approximately 10-ft below grade. The first drawing shows the tanks as they presently are, containing a sludge layer at the bottom with supernate above. The tanks are interconnected by piping so that material can be passed from one to the other. The attached side view drawing of a typical tank illustrates that the tanks already contain a variety of venting risers

The second drawing illustrates the excavation of trenches between the tanks to enable cutting and termination of the underlying piping. The drawing also shows how the tanks will be filled with a highly permeable fill material (e.g., select soil). It is likely that several more risers will be installed in the tanks in addition to those that already exist. The risers will be filled with a zeolite material that has the ability to trap radioactive cesium.

The third drawing illustrates placement of starter planes at the appropriate locations within the trenches as they are backfilled with select soil. In addition, refractory materials may be placed at the outer edges of the tank area to limit overmelting. The backfill and overburden material will be mounded several feet above the original grade to provide a source of material to fill in subsidence as it occurs during processing. This type of "subsurface" melting has proven to be much more energy efficient than the conventional top-down method which involves the melt being exposed directly to the hood interior. Melting under soil overburden greatly reduces heat losses to the hood. At this point, the site will have been fully staged for treatment.

The fourth drawing illustrates the initiation of two planar melts between the three tanks. As the melts grow and transfer heat to the tanks, evaporation of the water and other liquids present in the tanks will occur through the riser vents. These melts will heat up and dry out liquids present in all three tanks; however, the center tank will dry out more quickly than the others due to the presence of melts on both sides. Temperature within the risers is typically 100°C during this "drying out" period; therefore, we wouldn't expect there to be any significant movement of PCBs during this time. The gases are then collected under an off-gas hood and directed to our conventional off-gas treatment system. A pre-filter system may be employed in advance of the off-gas treatment system so as to prevent cesium particulate, if any, from reaching the off-gas trailer. Drawings 5 and 6 illustrate the melts getting larger until they merge together and complete treatment of the center tank.

Drawing 7 illustrates how individual planar melts will then be initiated outside the end tanks, which are also vented with risers and have been partially treated by the first tank melt processing. Whereas the first two melts will process all of the center tank and a portion of the end tanks, the end melts will complete the treatment of the end tanks, until a single large monolith will exist where the three tanks originally were (Drawing 8). This will complete treatment of the group of three V-Tanks.

Relative to whether or not this work can be done under the conditions of our existing TSCA Disposal Approval, we note the following:

1) All administrative aspects of the project will be performed as required by the existing permit. The treatment portion of the project will be done in less than 270 days; therefore, the process would be operated under the "mobile operations" provision.

2) After filling with select soil, liquids initially present within the tanks will be absorbed by

contents (feedstock) will not behave as a fluid (liquid) mass, but rather as a soil mass (solid, stabilized).

3) An extensive sampling and analytical plan will be implemented to meet all requirements for performance data, including that required of the client, EPA/TSCA, and Geosafe.

4) The expected electrode separation distance is 22-ft. The permit currently has a maximum electrode separation distance of 15-ft for the case of four (4) electrodes being used. In that case the separation distance relates to the side length of the square bounding the four electrodes; whereas, the electricity actually flows between opposing electrodes which are on the diagonal. That diagonal distance is 21.2-ft. The electrode separation distance for the proposed V-Tank project could be reduced to that diagonal distance if required; however, we would prefer to have the permit amended to the greater length after completion of the project. In addition, we believe that you may want to consider stating the electrode separation as the distance between the primary current-carrying electrode pairs rather than the distance to the nearest electrode as it is currently stated in the permit.

5) The 20-ft depth limit of the permit would be applicable if we can consider this depth to be the depth of melting as opposed to an absolute depth from grade level. The V-Tank project will involve melting within the range of 5 to 25-ft below grade.

6) Relative to PCB treatment effectiveness, we believe that there will be little if any difference between planar melting and conventional top-down melting. Both melt types are similar in temperature and other properties. They differ in size and shape only. Whereas planar melts would treat PCBs at the side of a melt relatively more than at the bottom of a melt, this condition would be similar to the treatment that occurs at the side of a large top-down melt. And whereas PCBs are exposed to one hot side during top-down melting, they will be exposed to hot melts on two sides during planar melting. Overall, we don't anticipate any noticeable difference in PCB treatment effectiveness between the two types of melts. As noted earlier, we do not expect any of the PCBs to move to the surface without treatment, due to the low temperature present within the risers. Lastly, it should be noted that the PCBs are present in the sludge layer at the bottom of the tank, which will maximize their exposure to, and residence time in, melt dry zone conditions.

It is important for DOE and LMITCO to know whether or not Geosafe's ISV technology can be performed on the V-Tanks either under our existing TSCA Disposal Approval or under demonstration provisions of the permit. If they select the ISV technology for treatment of the tanks, then they must be able to complete the tanks once started, subject to appropriate treatment and air emission standards being achieved. We have explained to DOE and LMITCO how EPA has worked with us in the past relative to obtaining and subsequently amending the permit. Based on recent discussions with you, we believe that application of planar-ISV to the V-Tanks

acquisition plan as necessary for use during the planar melting of the V-Tanks. Then, assuming success, the permit would be subject to amendment to encompass the planar melting conditions demonstrated for planar-ISV.

In order to satisfy the desires of DOE, LMITCO, EPA-10, and the State of Idaho, please provide either a letter indicating EPA's concurrence with the regulatory and demonstration process discussed above, or indicate concurrence by signing in the space provided below. To the extent that you would want to at this time, please also stipulate any special requirements you anticipate may be placed on us for the subject remediation. We understand that you will need to evaluate the project Work Plan before being able to finalize your requirements.

Thank you for your assistance. Please note that time is of the essence in that the parties are needing to work their proposed plan with the stakeholders as soon as possible. I will call you next week to obtain your estimate of time required to complete this request.

Best personal regards.

Sincerely,

GEOSAFE CORPORATION

Craig Timmerman

Craig L. Timmerman
Staff Engineer

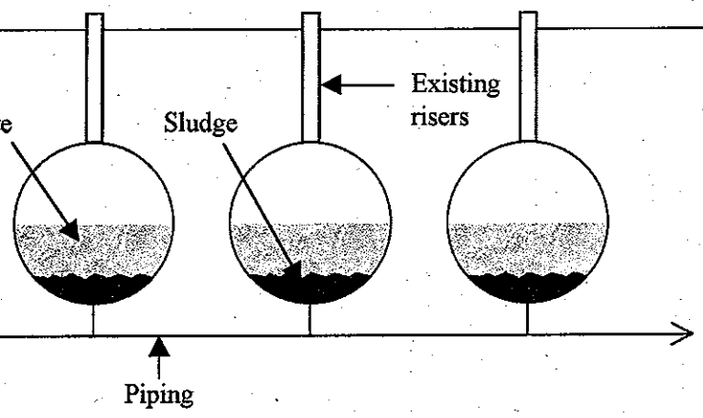
The Chemical Management Division (CMD) of the U.S. Environmental Protection Agency concurs with Geosafe's interpretation of the process to be used for demonstrating new conditions for purposes of broadening allowable permit conditions. The CMD agrees to work with Geosafe toward that end. The CMD reserves the right to withhold its final approval based on the requirements for an acceptable Work Plan and Data Acquisition Plan, including EPA attendance during the project to acquire independent samples.

Concurrence: _____, Date: _____

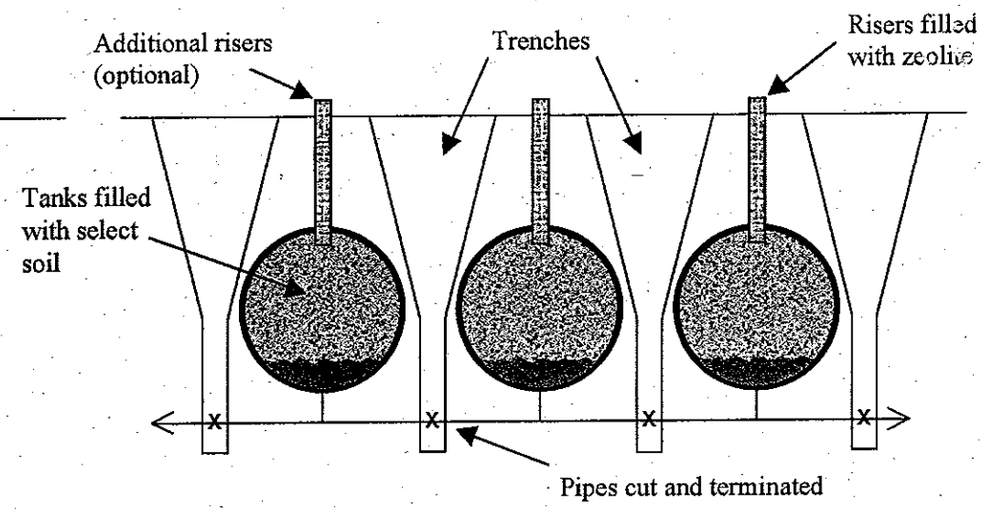
Title: _____

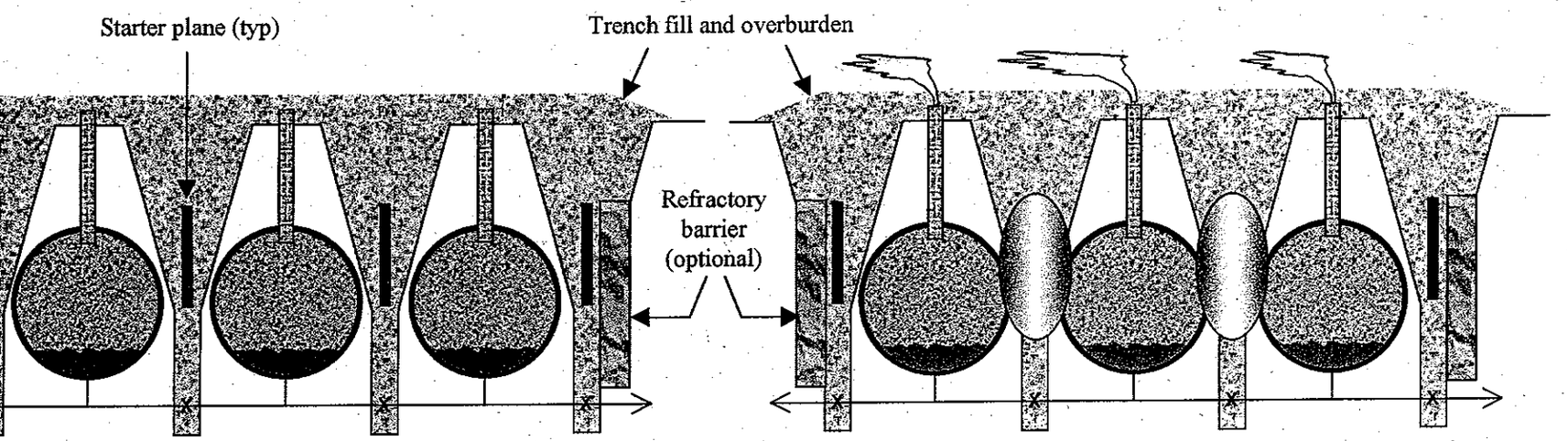
INEEL V-Tank Remediation Concept Employing Planar Melting

1. V-Tanks as they are



2. Filling tanks, trenching to terminate piping

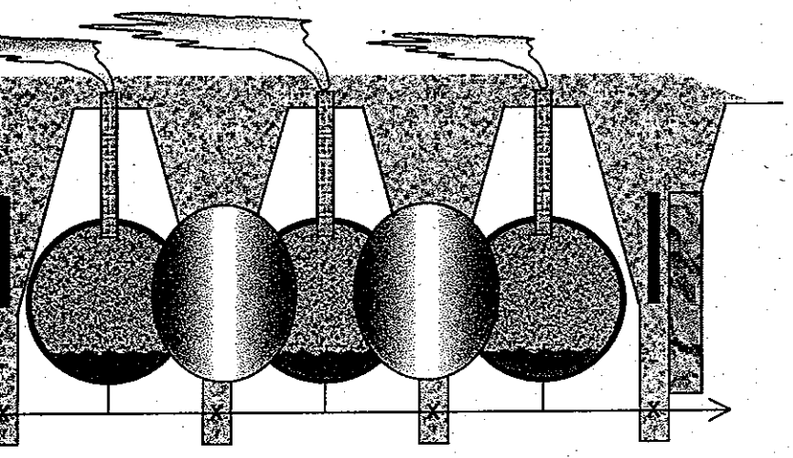




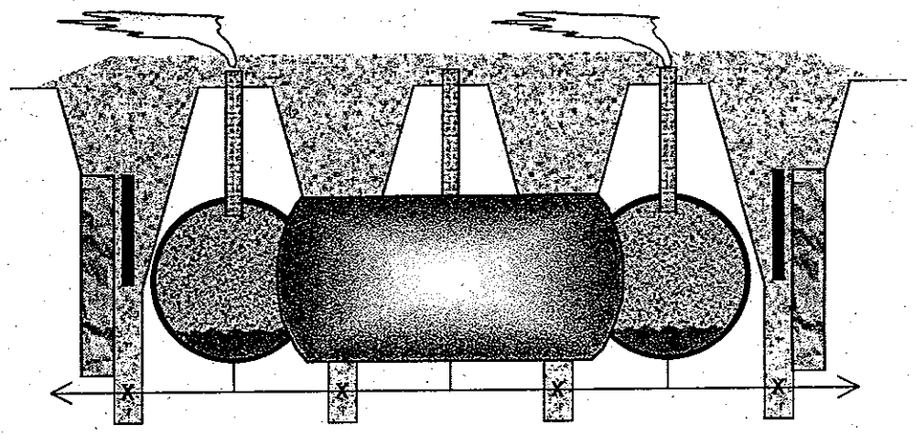
3. Placement of starter planes, fill, and optional refractory barriers

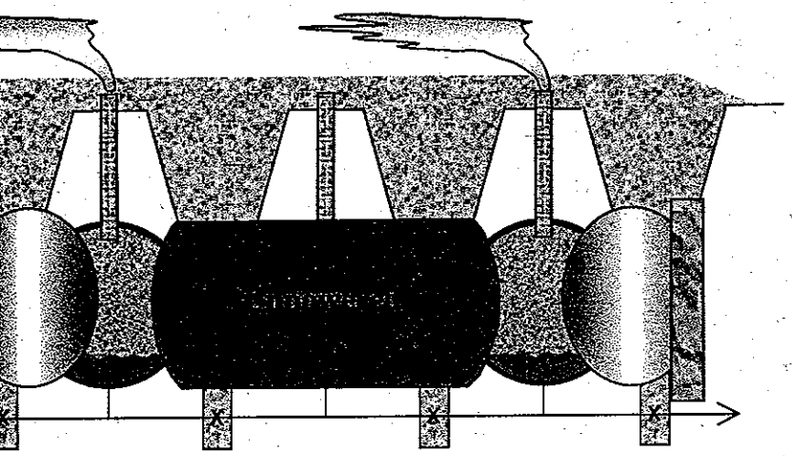
4. Initiation of center two planar melts

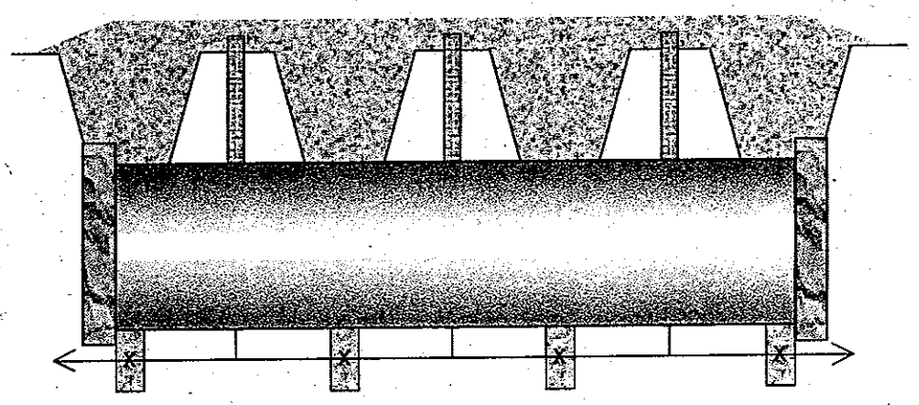
5. Water/liquid removal during planar melting



6. Merging of planar melts and completion of center tank







7. Water removal from end tanks; end melts only powered

8. Melt completion